The Creative Music Project: A cantometric analysis of fifth grade student composition[1]

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There is an emerging consensus that the integration of creative activities in the music classroom facilitates student engagement in the process of music learning. Research is beginning to provide evidence that children are not only fully capable of creating authentic musical compositions, but that they enjoy and benefit from engagement in creative musical activities (Barrett, 1996; Davies, 1986, 1992, 1994; Marsh, 1995; Upitis, 1990, 1992). A complex issue in the study of children's musical creativity, however, is that of assessment. How does one measure the success level of a child's creative product? Several different approaches have been used, ranging from the quantitative and highly influential approach utilized in the *Torrance Tests of Creative Thinking* (Torrance, 1974) to more qualitative methods such as that used by Gladys Moorhead and Donald Pond (1942). In the present study, we examine a method of music assessment called "Cantometrics," created by ethnomusicologist Alan Lomax (1976), in order to determine whether it might present a feasible method for identifying and profiling the most creative musical compositions of children.

In the spring of 2001, the Institute for Music Research at The University of Texas at San Antonio initiated a pilot program in association with Monroe May Elementary School to provide

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students with an opportunity to participate in such creative musical activities. The study involved two components, one of which will form the basis of the following paper. First, for an eight-week period, students met weekly with one of the investigators (DS) to receive hands-on experience in the craft of creating music using a computer and software sequencer. Second, in the week prior to and the week following this period of instruction, students participated in an experimental procedure designed to assess their ability to appropriately identify the tonal center in excerpts of ten Top 40 selections.[2] Results of the latter study have been presented elsewhere (Lipscomb & Hodges, 2002), so the following pages will focus on the actual results of the students' creative effort.

Research Questions

The objectives of the UTSA study described above were numerous: to indicate the feasibility of incorporating creative musical activities into the music classroom, to utilize technology for this purpose, to set a direction for future research, and to propose experience-based answers to a few broad questions of general interest to the music educator. The research questions related to the creative component of that study include the following: 1) Can a music technology composition program be implemented in a typical school computer lab using inexpensive, off-the-shelf music hardware and software tools? 2) Can typical – not just the "musically gifted" – students learn to create "quality" music effectively using these tools? 3) Can such a program be implemented within the parameters of a public school curriculum? 4) What teaching approaches seem most effective at encouraging musical creativity using technology? 5) Can Alan Lomax' *Cantometrics* – an analytical system used in the field of ethnomusicology – be

[2] The songs included in the study were: Ricky Martin's "Livin' La Vida Loca" and "Be Careful" (with Madonna), Matchbox 20's "Bent" and "If You're Gone," Britney Spears' "Don't Let Me Be the First to Know" and

used effectively in the process of evaluating student compositions? It is upon the 2nd and 5th questions that the present study will focus, though preliminary answers will be provided for each of the other research questions as well.

Alan Lomax and Cantometrics

The goal of the "Cantometrics" assessment tool was to develop a systematic method for identifying and describing recorded folk song performances in empirical terms so that these songs could be compared and clustered across and between different cultures. The system of analysis is composed of a set of descriptive items. Each of the 36 items provides 3 to 8 item descriptors from which to choose. Examples include such musical items as "tempo" (extremely slow, quite slow, slow, moderate, fast, very fast) and "melodic range" (within the fifth, within the octave, beyond the octave). The 36 items cluster into nine primary factors: differentiation, ornamentation, orchestra organization, vocal cohesiveness, choral organization, noise-tension level, energy level, rhythm, and melody. Lomax and colleagues applied the Cantometric system to about 4000 songs from more than 400 societies, representing all six continents (Lomax & Erickson, 1968, 1976; Grauer, 1965). The resulting analyses showed similar profiles among songs from geographic neighbors and songs belonging in the same known cultural traditions (Lomax, 1976). Lomax hypothesized from these profiles that, in general, a culture's song performance style seemed to represent generalized aspects of its social and communications systems.

The Cantometrics system was created primarily for vocal music. Lomax states, "Purely instrumental music is at present beyond the scope of Cantometrics although, with some

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"Oops … I Did It Again," N'Sync's "It's Gonna Be Me" and "Bye Bye Bye," and Chrstina Aguilera's "I Turn to You" and "Genie in a Bottle."

adjustments, the system might be used describe it" (1976, p. 71). Since the compositions created by children in this investigation were completely instrumental, we needed to adjust the Cantometrics tool to maximize its use for rating the subjects' compositions. Of the 36 items in the Lomax Cantometrics scale, 13 were chosen for use in the present investigation. These were selected by the investigators on the basis of relevance in determining differences between instrumental student compositions. The selected scales are:[3]

- [7] musical organization of the instruments (texture)
- [9] rhythmic coordination of the instruments
- [13] overall rhythmic structure
- [15] melodic shape
- [16] form
- [17] phrase length
- [18] number of phrases
- [19] position of final tone added by subject (in relation to complete composition)
- [20] overall keyboard range of subject's added or changed material
- [21] dominant melodic interval size
- [22] polyphonic type
- [30] use of tremolo
- [36] accent

The advantage of adopting Cantometrics as the primary analytical tool in evaluating student compositions is that attention was focused on the resulting musical sound, rather than notation or any other – largely arbitrary – symbol system, using clearly defined categorical judgments relevant to the musical sound under consideration. The specific analytical procedure and the results obtained will be described in detail below.

[3] The bracketed number preceding each item in the list represents the number of that scale in the context of Lomax' system. A complete version of the response form used by the investigators to rate each of the student compositions is provided in Appendix I. This includes both the number used in Lomax' system (in parentheses) and the sequential order used in the present investigation.

The Creative Music Project (CMP)

Subjects, Hardware, and Software

Subjects were fifth grade students in four music classes at Monroe May Elementary School. During each of the ten weeks in which this study was carried out, every class met with the researcher/instructor (DS) one time per week during the same time period that they met – during other weeks of the academic year – with their music teacher. Students came to the music computer lab instead of to the music classroom.

In the lab, there were 25 Windows-based computer stations, configured as follows: a 133 MHz Pentium processor, 32 MB RAM, a 2 GB hard drive, a SoundBlaster Live! sound card, LabTec LT 835 headphones, and a Creative Labs BlasterKey MIDI keyboard.[4] Cakewalk Express was used as the MIDI sequencing and composition software, since it was provided free of charge with each of the sound cards.

During the eight weeks of musical instruction – recall that two weeks of the ten week time frame were devoted to a pretest and posttest to assess tonality identification ability – the lessons focused primarily on learning to use the sequencer and completing a series of music composition[5] assignments. The principal focus of the creative music instruction involved developing a concept of musical form, though other aspects of the musical experience (e.g., melody, harmony, rhythm, texture, etc.) were introduced as a means of facilitating student understanding related to the concept of musical organization. One of the significant features of this study was the intentional use of the popular music idiom … the one with which students are

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[4] Purchase of the sound cards, headphones, and keyboards was made possible by a grant received from Texaco Corporation.

[5] For the purpose of this study, the term "composition" will be defined as a MIDI file submitted by any student in fulfillment of one of the creative music assignments.

certainly most familiar. Students were provided a great deal of freedom regarding the end result of their creative efforts. Sonic combinations typical of popular music contexts, however, were not in any way discouraged. In fact, the specific manner of composition (i.e., use of a computer sequencer) and associated instructional methods were likely to have facilitated this factor.

Method of Creative Instruction

A series of lesson plans was created by one of the investigators (DS), including illustrative handouts and assignment templates. Each weekly session – 30 minutes in length – followed a prescribed format:

1. instructor presets computers (15 minutes prior to class time)
2. **students arrive and instructor introduces musical concept(s) of the day (10 minutes)**
3. **students work on their individual computers while instructor observes (15 minutes)**
4. **students save their work and listen to selected samples of the previous week's assignment (5 minutes)**
5. students depart and instructor resets the computers (5 minutes following class time)

As can be seen from this outline of activities, items 2 through 4 are the steps that involved student instruction and creative activities. Weekly topics included music as "sound organized in time," the repetition of sound patterns, strong & weak beats (meter), tempo, layering of sounds (texture), melodic shape (contour), melodic repetition (phrases), and musical forms (ABA, ABCBA, ABACA, etc.).

To provide an example of the instructional materials that were disseminated to the students and the method of their use, we will provide a detailed outline of the initial hands-on instructional session. At the outset, a general overview of the specific task was provided, along with a clear statement of objectives for the session. For session one, these included the following:

- In this session, you will create a repeating measure of music that sounds like a percussion cadence.
- You will learn what music is at its most basic level.

- You will learn some of the rules that make "music" different from "sound."
- You will follow some suggestions that can make music sound even better.
- You will learn how to operate a professional music sequencer.

Step-by-step instructions were then disseminated in hardcopy form to each student. After a brief period of verbal elaboration by the instructor concerning the musical task, the students began working on their assignment. Of the 13 steps included in the handout for session one, two representative frames are provided in Figures 1a and 1b.

Figure 1. Lipscomb & Kendall's (1996) model of Film Music Perception. Reprinted with permission of *Psychomusicology*.

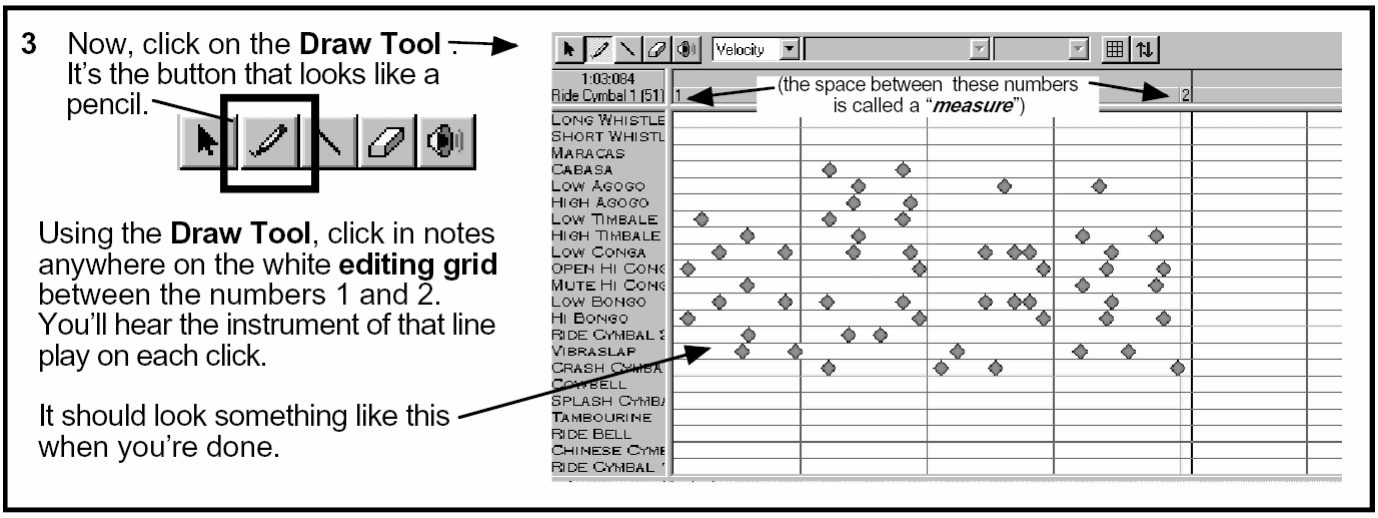
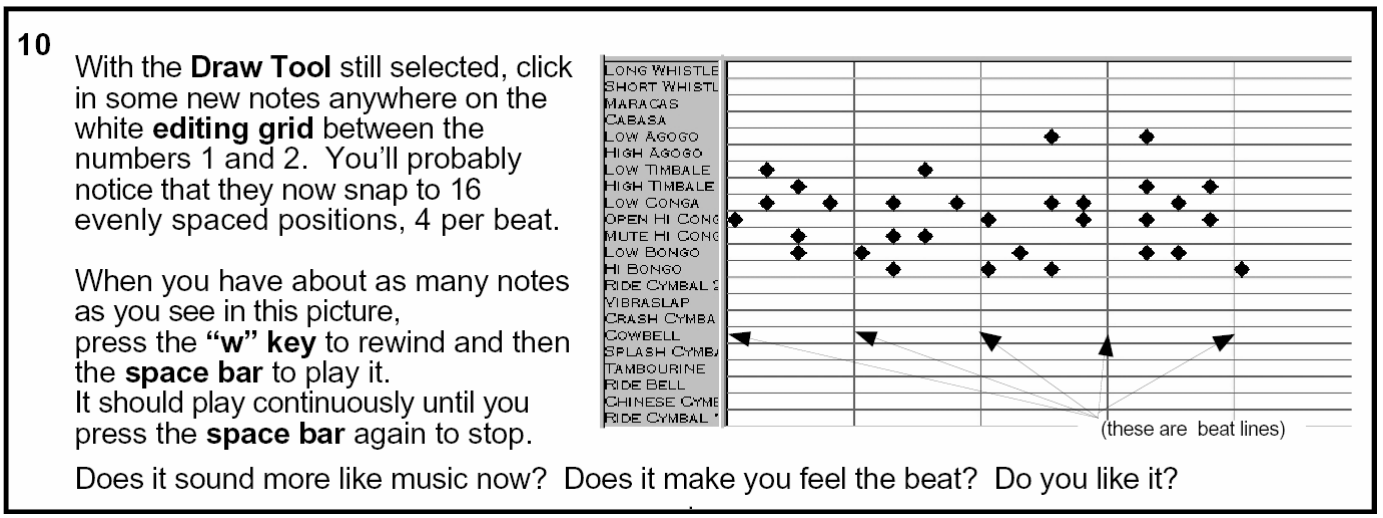


Figure 1b. Additional instructions regarding editing a composition and playback.



In its concluding paragraphs, the handout provided a brief summary of the day's activities, including specific musical concepts learned. For the initial session, the summary included the following:

> In this first project, you've learned …
>
> 1. … that you can make music by organizing time with sound.
> 2. … that, in music, sounds and sound groups **repeat** a lot (repetition helps you remember) (repetition helps you remember) (repetition helps you remember) (repetition helps you remember)
> 3. … that, in music, sounds and sound groups most often occur at evenly spaced instants of time.
> 4. … that the most common time division is 4 parts of 4 parts.
> 5. … that a heavy (loud) beat makes music sound more like rock style.
> 6. … how to keep your composition sounding clean and uncluttered.
> 7. … what a sequencer is and how to use it.
> 8. … what it means to quantize something.
> 9. … how to save a MIDI sequence, so it can be played on the Internet.
>
> Next time you'll create a bigger piece that sounds even better and you'll learn more secrets for making music that sounds great!

Materials for all of the following sessions were organized similarly with the addition of a brief period of review at the beginning of each of these classes so that students would be reminded of musical concepts introduced in the previous session(s). As students completed each assignment, the MIDI files were saved to the lab server. These files were used as the basis for the Cantometric analysis in the present investigation.

Materials for Analysis

As a means of answering the research questions posed at the outset of this paper, 86 student compositions were evaluated. These specific compositions were submitted during the fourth week of instruction, the midway point in the students' CMP experience. Students were given a MIDI file template consisting of a repeating rhythmic pattern performed by two instruments: drum set and electric bass (Figure 2). Students then used this template as a starting point for their Week 4 composition. Two investigators (SL & MH) utilized their adapted

Cantometric system of analysis and independently analyzed the compositions which were presented in unique random orders.

In addition to the Cantometric evaluation, both investigators individually rated every composition on a scale of similarity in relation to the template provided to each student as a beginning for the assignment. In this way, values were assigned based upon the perceptual judgment of similarity – or, conversely, difference – between what the student was given and what was submitted in fulfillment of the assignment. Compositions with high ratings on the scale of similarity exemplified submissions that exhibited little change between the template given the student and the resulting composition. Compositions with low ratings of similarity were typical of assignments in which students made the most significant alterations to the template and, hence, tended to exemplify a higher degree of creativity. The issue of quality will be addressed in a subsequent discussion. The purpose of this comparison was to see if the more creative (i.e., different) musical compositions had a dissimilar "Cantometric profile" when compared to the rest of the compositions.

Data Analysis and Interpretation

The two investigators (SL & MH) adapted the Cantometric system of analysis so that it would be appropriate for rating subjects' instrumental compositions, created using a computer sequencer. The resulting scale contains 13 items from the original Cantometrics scale, with item descriptors either the same as, or slightly adjusted from, the original (see Appendix I to view the adjusted Cantometrics scale). Both investigators used this revised Cantometrics scale to independently and randomly analyze all of the compositions.

Before combining judges' scores, an analysis of separate scores on the Cantometrics tool revealed close agreement between the two judges on nearly all of the items.[7] Item 9 (keyboard range) and Item 11 (polyphonic type), however, showed drastically different responses from the two judges. Upon conferring with one another, it became immediately apparent that conceptual understanding of these two items varied significantly. Therefore, these items were not included in the discussion that follows.

In addition to the Cantometric evaluation, both investigators also individually rated every composition on a 5-item Likert scale of similarity (descriptor 1 was described as "same; identical", descriptor 5 was described "Not same; vastly different"). Mean similarity scores were calculated for each student composition. Compositions that received an average similarity score of 4.5 or greater were separated from the pool of other ("less different") compositions. Out of the 86 compositions analyzed, seven student compositions fit into the "most different" category, leaving 79 compositions in the "less different" category. The response choices for each item were tallied and the percentages for the combined scores for the "less different" compositions are shown in Table 1. Lines are added to highlight the choice(s) that receive the highest percentage of responses within each scale. Lomax used this method of connecting the largest percentage of response choices in order to draw attention to the "profile differences" of distinct social groups. Cantometric ratings for the "most different" compositions were analyzed separately and a profile was created (Table 2).

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[7] Statistical analysis revealed a high level of inter-judge correlation (r = .80).

Table 1. Chart representing combined total of investigator ratings on the Cantometrics scale (shown in percentages) for compositions considered “less different” when compared to the template. The added line serves to highlight the choice(s) within each scale that received the highest number of responses.

	A	B	C	D	E	F	G	H
1. texture	0	1	0	0	**92**	8		
2. rhythmic coordination	3	18	**78**	1	0			
3. rhythmic structure	0	3	1	**95**	1			
4. melodic shape	**90**	1	2	6	1			
5. form	3	**43**	29	1	24	0		
6. phrase length	0	6	26	**64**	3			
7. number of phrases	0	1	0	0	6	1	8	**85**
8. position of final tone	3	8	16	31	**34**	8		
10. interval size	**90**	0	4	3	3	0		
12. tremolo	0	0	**100**					
13. accent	15	15	**57**	10	4			

Table 2. Chart representing combined total of investigator ratings on the Cantometrics scale (shown in percentages) for the subjects whose compositions were ”most different” when compared to the template. Note that the triangle shape around item 4 (melodic shape) results from the fact that an equal number of the compositions fell into categories A and D.

	A	B	C	D	E	F	G	H
1. texture	0	31	0	0	**38**	31		
2. rhythmic coordination	15	23	**38**	15	8			
3. rhythmic structure	**43**	14	7	**36**	0			
4. melodic shape	**38**	8	15	**38**	0			
5. form	**50**	29	14	7	0	0		
6. phrase length	0	0	**54**	31	15			
7. number of phrases	0	0	0	8	25	0	0	**67**
8. position of final tone	0	21	14	7	**43**	14		
10. interval size	**38**	8	31	0	8	15		
12. tremolo	0	7	**93**					
13. accent	**21**	7	7	**21**	**43**			

A comparison between the profiles of compositions deemed "most different" from the template and the profile of all other ("less different") compositions presents clear differences. Six of the resulting nine items show a difference between these two groups (see Table 3).[8] Overall, the "most different" compositions seem to be spread out over item description categories in comparison to a more focused distribution evidenced across the other compositions (e.g., see especially the comparison of rhythmic structure, melodic shape, interval size, and accent in Table 3). The "most different" compositions tended to have greater variety (i.e., difference from an established convention) than the "less different" compositions. Figure 3 provides a graphic representation of the two overlaid Cantometric profiles to clearly illustrate the differences. For instance, in rhythmic structure, while 95% of "less different" compositions were described as being in "simple" meter, 43% of the different compositions were described as "free" meter. The "most different" compositions were more through-composed (50%), had more and greater melodic intervals, and more variety in accent type compared to all of the compositions.

Table 3. Comparison of selected item differences between all compositions and compositions from "most different" group.

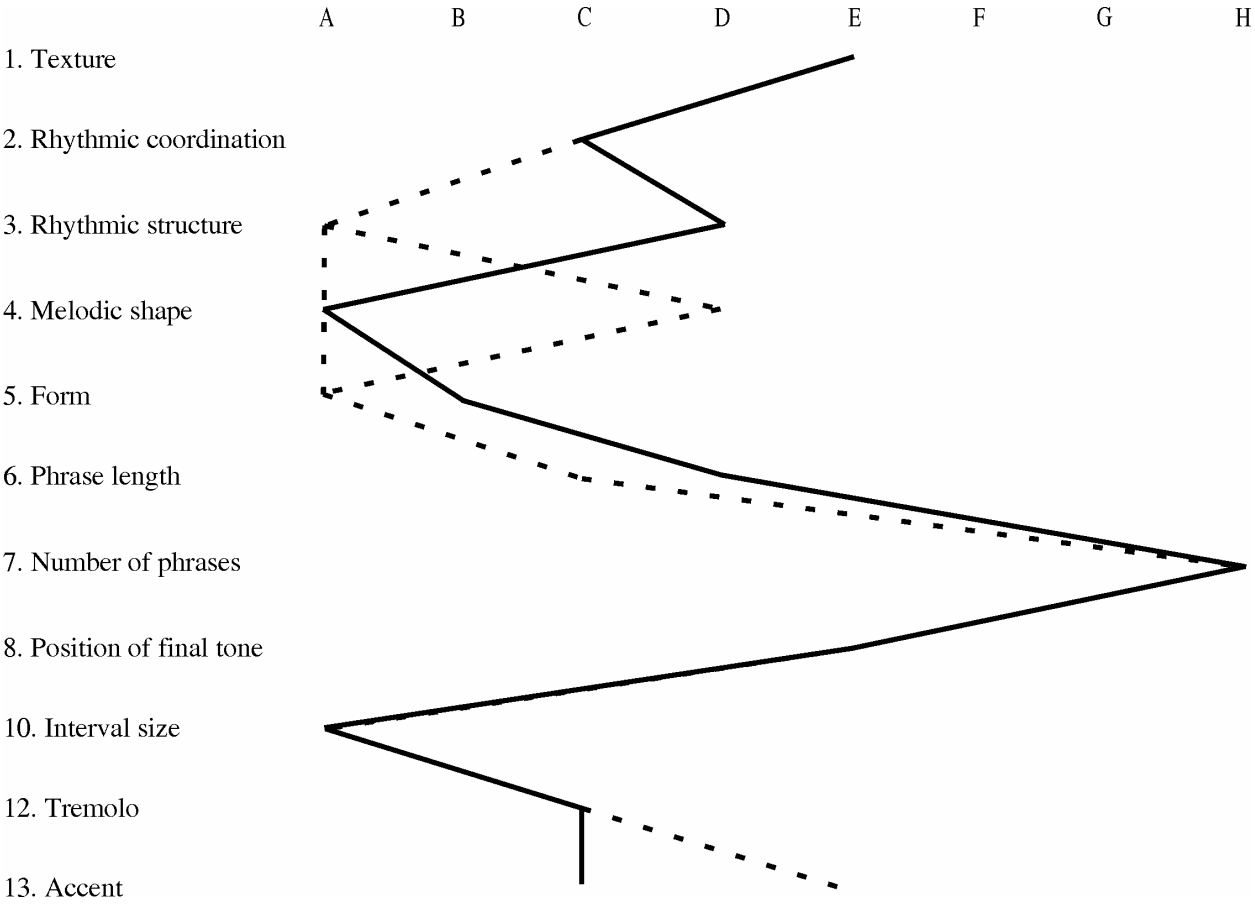
Item:	"Less Different" Compositions	"Most Different" Compositions
3. rhythmic structure	Choice D (simple) 95%	Choice A (free) 43%; Choice D (simple) 36%
4. melodic shape	Choice A (no discernable melody) 90%	Both Choice A (no discernable melody) and Choice D (undulating) 38%
5. form	Choice B (repetitive with some variation) 43%	Choice A (through-composed) 50%
6. phrase length	Choice D (short 2 ms.) 64%	Choice C (medium 3-4 ms.) 54%

[8] A complete set of graphs comparing the "Most Different" compositions to the other compositions on each of the 13 scales can be found at: http://faculty-web.at.northwestern.edu/music/lipscomb/cantometric/. The PowerPoint presentation for the ESCOM 2002 conference is also available via this web page.

10. interval size	Choice A (no discernable melody) 90%	Choice A (no discernable melody) 38%; Choice C (1/2 step or less) 31%; Choice F (4ths & 5ths or larger) 15%
13. accent	Choice C (medium, accents conform to main beat pattern) 57%	Choice A (very forceful) 21%; Choice D (relaxed) 21%; Choice E (very relaxed) 43%

These traits might be indicative of more creative composers, since creativity is often defined as being unusual or novel (Meyer, 1999). However a creative product is one that is not only novel, but also "appropriate" or "valuable" in the context of a domain (Meyer, 1999). While a subgroup of compositions in this study were determined to be "most different" from the original template, their quality was not assessed in order to determine whether they were also the "most creative."

Figure 3. Overlaid Cantometric profiles for "more different" (dashed line) and "other" compositions (solid line). Note that the triangle shape around item 4 (melodic shape) results from the fact that an equal number of the compositions fell into categories A and D.



Conclusion

Results of the present study confirm that it is quite possible for typical fifth grade students to create musical compositions. The "quality" – admittedly, a loaded word – of these compositions was wide-ranging. Some exhibited little change from the template, while others were dramatically altered from the original state. It is even possible that aesthetic judgments on a scale of "value" or "beauty" might have sometimes favored the former over the latter. These students were all what would be considered "typical" elementary age children. None of the students involved in these classes had received a high degree of musical training. As a result, the

results of the present investigation cannot compare performance of musically gifted students to that of their peers. However, from the compositions submitted by these students, it is clear that the potential for creativity is clearly evident in a high percentage of these 11 and 12 year olds.

Though further research will be necessary to determine the most effective instructional methods for engaging students in such activities, it does seem feasible to implement such a music technology composition program in a typical computer lab, using inexpensive, off-the-shelf software and hardware. Working around the class schedule and within the strict time frame allotted for arts in the public school curriculum posed a certain challenge. However, with a modicum of patience and a willingness to be flexible, the modest instructional goals of the study were accomplished within the 10-week period. As is always the case in such research, a longer period of time would have been desirable.

Several practical issues arose that may assist future investigators interested in the study of musical creativity using computer technology.

1. *Don't install unnecessary software*. This is especially important when using older computers that have a severely limited amount of hard drive space available.
2. *Written materials should be simplified* (or perhaps eliminated). Students of all ages seem to be less than inclined to read pages of text-based directions when sitting in front of an interactive tool like the computer. Templates assisted with this process, but incorporation of mediated directions into the program itself may prove to be more ideal.
3. *Use a simpler music creation tool*. The focus of instructional sessions often turned toward teaching students *how to use the tool*, rather than how to create music.

The Cantometrics scoring procedure appears to be not only a feasible and easy-to-use method for assessing commonalities and differences among children's musical compositions, but also a potentially useful method for identifying those children most different than the "norm." Are these compositions the most creative? Are they better in quality than the others? These questions must still be answered. Combined with a method for assessing the overall quality of compositions, the Cantometrics method may prove useful for identifying highly creative compositions and the associated student composer. This method might also be potentially useful for identifying developmental age differences in music composition procedures of children.

As Lomax states, "Music seems to be an intentionally ambiguous medium. Cantometrics analysis tries to reduce this ambiguity by establishing standardized descriptions of performance style" (1976, p. 80). Perhaps Cantometrics analysis can provide a needed step for researchers to begin to understand better the composition style of children of different ages, cultures, and abilities.

Appendix I

Cantometrics Scale for Children's Musical Composition
(A. Lomax; modified by Scott Lipscomb & Maud Hickey)

1. (7) Musical organization of the instruments (texture)
    a. ____ no instruments (or two or more instruments totally uncoordinated)
    b. ____ monophony
    c. ____ unison
    d. ____ heterophony (same melody but in slightly different manners)
    e. ____ homophony
    f. ____ polyphony

2. (9) Rhythmic coordination of the instruments
    a. ____ little or no blend (instruments do not reinforce each other)
    b. ____ minimal blend
    c. ____ good blend
    d. ____ unison
    e. ____ maximal blend. ("Total effect is highly sonorous; the overall sound is perceived as 'rich'").

3. (13) Overall rhythmic structure
    a. ____ free
    b. ____ irregular
    c. ____ one beat
    d. ____ simple
    e. ____ complex

4. (15) Melodic Shape
    a. ____ NA (no discernable melody)
    b. ____ arched
    c. ____ terraced
    d. ____ undulating (wave like shape-or predominantly ascending)
    e. ____ descending

5. (16) Form
    a. ____ through-composed
    b. ____ repetitive with some variation
    c. ____ repetitive with little or no variation
    d. ____ strophic
    e. ____ other form _____
    f. ____ Canonic or round form

6. (17) Phrase Length
    a. ____ very long 8+ ms.
    b. ____ long 4-8 ms.
    c. ____ medium 3-4 ms.
    d. ____ short 2 ms.
    e. ____ very short 1 ms.

7. (18) Number of phrases
    a. ____ 8+
    b. ____ 5-7
    c. ____ 4 or 8 – asymmetrical
    d. ____ 4 or 8 – symmetrical
    e. ____ 3 or 6 – asymmetrical
    f. ____ 3 or 6 – symmetrical
    g. ____ 2 – asymmetrical
    h. ____ 1 or 2 – symmetrical

8. (19) Position of Final Tone added by subject (in relation to total song)
    a. ____ NA
    b. ____ lowest note
    c. ____ lower half
    d. ____ midpoint
    e. ____ upper half
    f. ____ highest note

9. (20) Overall Keyboard Range (of subject's added or changed material)
    a. ____ within a fifth
    b. ____ within an octave
    c. ____ 1 to 2 octaves
    d. ____ 2+ to 3 octaves
    e. ____ 3+ octaves

10. (21) Interval size (dominant; in melody)
    a. ____ NA (no discernable melody)
    b. ____ monotone
    c. ____ Small - 1/2 step or less
    d. ____ medium or diatonic – mostly whole steps
    e. ____ large - 3rds or more
    f. ____ very large - 4ths & 5ths or larger

11. (22) Polyphonic type
    a. ____ none
    b. ____ drone
    c. ____ isolated chords
    d. ____ parallel chords
    e. ____ harmony (contrary motion occurs)
    f. ____ counterpoint

12. (30) Tremolo
    a. ____ much
    b. ____ some
    c. ____ little or none

13. (36) Accent
    a. ____ very forceful (accents falling on most notes)
    b. ____ forceful (accents falling on main pulses)
    c. ____ medium (accents conform to main beat pattern)
    d. ____ relaxed (some accent)
    e. ____ very relaxed (nearly unaccented)

References

Barrett, M. (1996). Children's aesthetic decision-making: an analysis of children's musical discourse as composers. *International Journal of Music Education*, 28, 37-62.

Davies, C. D. (1986). Say it till a song comes (reflections on songs invented by children 3-13). *British Journal of Research in Music Education*, 3(3), 279-293.

Davies, C. D. (1992). Listen to my song: a study of songs invented by children aged 5 to 7 years. *British Journal of Music Education*, 9, 19-48.Davies, C. D. (1994). The listening teacher: an approach to the collection and study of invented songs of children aged 5 to 7. In H. Lees (Ed.), Musical connections: tradition and change. Proceedings of the 21st world conference of the International Society of Music Education, (pp. 120-128). Tampa, FL: ISME.

Grauer, V. A. (1965). Song song style clusters—a preliminary study. Ethnomusicaology, 9(3).

Lipscomb, S.D. & Hodges, D. (2002). Tonality Judgments in Popular Music Contexts by Pre-Teens and College Students: A Comparative Analysis. Paper presented at the Music Educators National Conference. Nashville, TN (April, 2002).

Lipscomb, S. D., & Kendall, R. A. (1994). Perceptual judgement of the relationship between musical and visual components in film. *Psychomusicology*, 13, 60-98.

Lomax, A. (1976). Cantometrics: A method in musical anthropology. Berkeley, CA : University of California Extension Media Center.

Lomax, A., & Erickson, E. E. (1968). Folk song style and culture. American Association for the Advancement of Science. Publication; no. 88

Marsh, K. (1995). Children's singing games: composition in the playground? *Research Studies in Music Composition*, 4, 2-11.

Meyer, R.E. (1999). Fifty years of creativity research. In Sternberg, R. J. (ed.), Handbook of creativity, pp. 449-460. Cambridge University Press.

Moorhead, G. & Pond, D (1942). Music of young children. Santa Barbara, CA: Pillsbury Foundation.

Torrance, E. P. (1974). The Torrance tests of creative thinking: Technical-norms manual. Bensenville, IL: Scholastic Testing Services.

Upitis, R. (1990). This too is music! Portsmouth, NH: Heinemann.

Upitis, R. (1992). Can I play you my song? the compositions and invented notations of children. Portsmouth, NH: Heinemann.

Wiggins, J. H. (2000). The nature of shared musical understanding and its role in empowering independent musical thinking. *Bulletin of the Council for Research in Music Education*, 143, 65-90.